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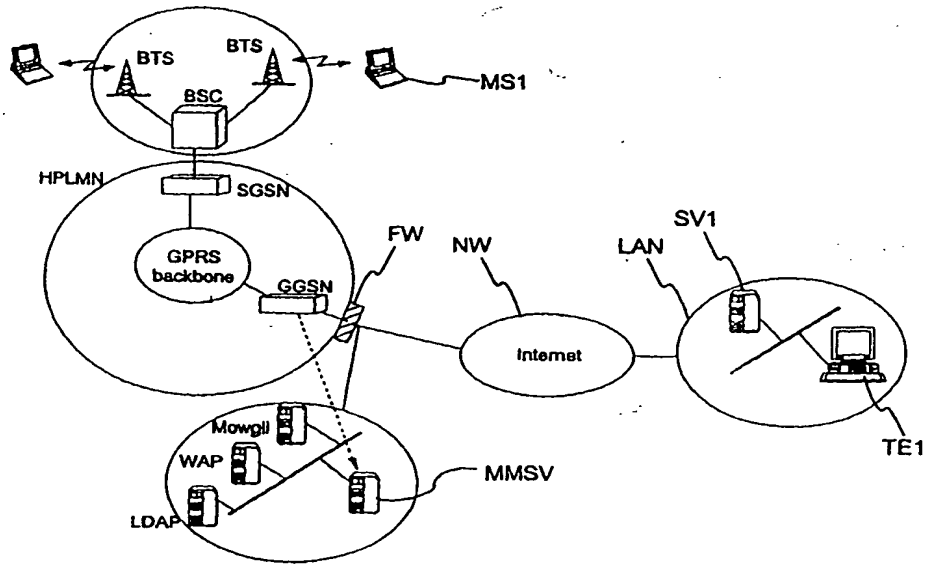
(54) Title: A METHOD FOR TRANSMITTING MULTIMEDIA MESSAGES AND A MULTIMEDIA MESSAGE COMMUNICATION SYSTEM



(57) Abstract

The invention relates to a method for transmitting multimedia messages to a wireless terminal (MS1) in a data transmission system which comprises at least one mobile communication network (HPLMN) and at least one multimedia message server (MMSV). In the method, each wireless terminal (MS1) connected to the mobile communication network (HPLMN), is allocated an address specifying said wireless terminal (MS1), and at least one data transmission connection is activated for said wireless terminal (MS1). Information on the activation of the data transmission connection for said terminal (MS1) is transmitted to the multimedia message server (MMSV).

A method for transmitting multimedia messages and a multimedia message communication system

The present invention relates to a method according to the preamble of the appended claim 1 for transmitting multimedia messages. The invention also relates to a multimedia message communication system according to the preamble of the appended claim 8, a multimedia message server according to the preamble of the appended claim 12, and a multimedia terminal according to the preamble of the appended claim 13.

In e-mail systems, it is possible to transmit messages between terminals. E-mail systems have been primarily only used the transmission of fairly short messages in text form from a source terminal to a destination terminal, but with the increase in multimedia applications, a need has arisen to transmit also other messages than those in text form. In this specification, such multimedia messages refer to the transmission of images, audio, video, files and other binary data in a so-called store-and-forward fashion. This store-and-forward fashion means that when the recipient is coupled to an e-mail network, the message is transmitted to the recipient immediately, and when the recipient is not coupled to the e-mail network the message is stored in an e-mail server. In this latter case, the aim is to transmit the message to the recipient later when the s/he is coupled to the e-mail network.

The quantity of information contained in multimedia messages can vary widely, for instance according to the type of information in question. For example in the case of so-called still images, the typical quantity of data is in the order of 50 kilobytes to a few hundred kilobytes. However, in audio and video messages, the quantity of information can be considerably larger than this. In this specification the term "multimedia terminal" will be used for such a terminal with which this kind of multimedia information can be processed.

In order to make mobility possible, the terminal can be provided in connection with a wireless communication device, wherein the terminal

An Internet terminal connected to the Internet data network has a specified Internet address, which can either be static or dynamic, wherein when dynamic, it is produced for example with a dynamic host configuration protocol (DHCP) in that local area network server to which the terminal is being connected.

The IP defines the data transmission in packets, which makes a burst transmission possible. Thereby the same data transmission channel can be used in several connections simultaneously by sending the packets of different connections in different time slots.

In packet transmission according to the Internet protocol, it is possible to transmit the packets directly to the recipient only when the network parts of the addresses of both the sender and the recipient are the same. Otherwise, the packets are transmitted to a router, which is responsible for transmitting packets further, either to a next router or to the recipient, if the recipient is in the network of the router. In each router, the header field of the packets entering the router is examined, and on the basis of the address information contained in it, it is determined where the packet is to be transmitted. Packets transmitted via the same route form a so-called data transmission stream. Since the Internet protocol is characteristically a connectionless protocol, the above presented procedures have to be conducted for each packet entering the router.

E-mail systems typically comprise one or more e-mail servers for the purpose of e.g. routing the departing e-mails forward, and receiving and storing such e-mails which are addressed to a recipient logged in the e-mail server in question. This kind of an e-mail server can be, for example, a server located in the internal local area network of a company and having also e-mail server functions. It is, however, possible that the e-mail server is a separate server in the local area network, but this not significant with respect to applying the present invention.

system could be the following: "telephone number@GPRS.operator. country".

GPRS is a new GSM service, by means of which GSM users can be provided with a packet radio function. The GPRS allocates radio resources only when there is something to be transmitted, wherein the same resources are divided among all mobile stations according to the need. The conventional circuit switched network of the GSM system is designed for circuit switched speech transmissions, whereas the primary aim of the GPRS service is to implement thr coupling from a mobile station to a public data network by using known protocols, such as TCP/IP, X.25 and CLNP. However, there is a connection between the packet switched GPRS service and circuit switched services of the GSM system. On the physical channel, resources can be used again and certain signallings can be shared. On the same carrier, it is possible to allocate time slots for circuit switched operation and packet switched GPRS operation.

Fig. 1 presents telecommunication network connections in the packet switched GPRS service. The main element in the network infrastructure for GPRS services is a GPRS support node, so-called GSN. It is a mobility router which implements coupling and co-operation between different data networks, for example to the public switched packet data network PSPDN via a connection Gi, or to the GPRS network of another operator via a connection Gp. It also implements mobility management together with GPRS registers via a connection Gr and transmission of data packets to mobile stations MS irrespective of their location. Physically, the GPRS support node GSN can be integrated with a mobile switching center MSC, or it can be a separate network element based on the architecture of data network routers. The user data is passed directly via a connection Gb between the support node GSN and a base station system BSS formed of base stations BTS and base station controllers BSC, but in between the support node GSN and the mobile switching center MSC there is a signalling connection Gs. In Fig. 1, solid lines between blocks illustrate data communication and broken lines illustrate signalling. Physically, data can be passed

network at that moment, and whether it has active packet data connections. This examination can be conducted for example in such a way that the e-mail server MSV transmits a query message to a name server DNS attached to the GPRS system. If the wireless terminal MS1 of the recipient is connected to the GPRS network PLMN, and has an active packet data connection, the name server DNS transmits to the e-mail server an acknowledgement message, with which it indicates the IP address of the wireless terminal MS1 of the user. If the wireless terminal MS1 of the user is not connected to the GPRS network at that moment, the e-mail server MSV transmits the query message again later. If a static IP address is determined in the wireless terminal MS1 of the recipient, the e-mail server MSV can transmit IP query packets to this IP address, wherein the wireless terminal MS1 of the recipient transmits an acknowledgement message to the e-mail server MSV. If no acknowledgement message is received, e-mail messages cannot be transmitted to the wireless terminal MS1 of the recipient at that moment. Also in this alternative, query messages have to be transmitted repeatedly, if the wireless terminal MS1 of the recipient is not coupled. This above presented polling causes an unnecessary load on the data network and on the capacity of the GPRS network and delays in the e-mail message transmission, especially if the wireless terminal MS1 of the user is not connected to the GPRS network at the moment of query. In that case, the e-mail message can be transmitted to the destination only after the wireless terminal MS1 of the recipient has first logged in the GPRS network and activated a packet data connection, after which, at some stage, the e-mail server MSV transmits a query message. In systems of prior art, the e-mail server MSV has no possibility of defining the coupling of the recipient to the GPRS network except by polling.

One purpose of the present invention is to provide a method for transmitting multimedia messages to a wireless terminal as soon as possible after a packet data connection to the packet radio network is activated in the wireless terminal, a multimedia message communication system applying the method, and a multimedia terminal. The invention is based on the idea that the gateway support node of

Fig. 2 shows an e-mail system in a reduced manner,

Fig. 3 shows a multimedia message communication system according to a preferred embodiment of the invention,

Fig. 4 shows an example of signalling when a wireless terminal is logging in to a network,

Fig. 5a shows an example of signalling when the wireless terminal activates a packet data connection to a network,

Fig. 5b shows a second example of signalling when the wireless terminal activates a packet data connection to a network, and

Fig. 5c shows an example of signalling when the wireless terminal deactivates a packet data connection.

To understand the invention, it will be described in the following with reference to a packet radio system of prior art in Fig. 1 and to a multimedia message communication system according to a first preferred embodiment of the invention in Fig. 3. The descriptions are also suitable for application examples when the application environment of the invention is advantageously similar.

Fig. 3 presents a multimedia message communication system according to a preferred embodiment of the invention, comprising a packet radio network HPLMN, which is for example the GPRS network of the GSM mobile communication system. This packet radio network HPLMN is coupled into a data transmission connection with the Internet data network NW via a gateway support node GGSN. In addition, the multimedia message communication system comprises a multimedia message server MMSV, which is, for example, an e-mail server of the system according to Fig. 1, supplemented with features according to the invention, which will be discussed below in this description. The multimedia message server MMSV is, for example, a server maintained

the encryption key is exchanged (stage 404) between the wireless station MS1 and the network, as is known for example from the GSM system. Next, the wireless terminal MS1 transmits a logon request for packet services to the serving packet service support node SGSN (stage 405). The request contains, for instance, the identification of the wireless terminal MS1 and parameter data for encryption. The serving packet service support node SGSN conducts an address request process to the gateway support node GGSN (stage 406). The serving packet service support node SGSN transmits a logon request for packet services to the gateway support node GGSN (stage 407), which registers the location of the wireless terminal MS1 by updating the routing table (stage 408) and replies to the logon request (stage 409). Thus, the serving packet service support node SGSN confirms to the wireless terminal MS1 the logon to the packet services (stage 410), wherein it gives the wireless terminal MS1 a temporary logical link identity TLLI to be used as an address in data transmissions between the wireless terminal MS1 and the serving support node SGSN. This TLLI identification is used in the air interface Um of the packet radio to identify the wireless terminal MS1. The logon confirmation message from the serving support node SGSN to the wireless terminal MS1 typically also contains a wireless terminal MS1 identification and a cell identification (in the range of which the wireless terminal MS1 is located). Referring to stage 410, it is known from circuit switched technics that the wireless terminal MS1 is allocated a specified channel, in other words a specified time slot of the TDMA frame to be used for transmission and reception, i.e. the channels of the up-link and the down-link are provided in pairs. In the GSM GPRS packet service, the support node SGSN provides the wireless terminal MS1 with information on one or more channels of the down link, to be used in the communication of the down link. The wireless terminal MS1 indicates that it is ready for the packet service connection (stage 411), after which the encryption parameters are exchanged for the packet services between the wireless terminal MS1 and the serving support node SGSN (stage 412). After this, the wireless terminal MS1 moves into a wait state, wherein the channel is deallocated (stage 413).

address. In addition, the gateway support node supplements its packet data connection table with the data on this new connection, on the basis of which the gateway support node GGSN routes the incoming and outgoing packets of the packet data connection. The gateway support node GGSN transmits a reply message to the serving support node SGSN (stage 504), which contains information on whether the connection has been activated or not. The serving support node SGSN transmits to the wireless terminal MS1 an acknowledgement message on the activation of the packet data connection (stage 505). In the acknowledgement message, information on the activated packet data connection is transmitted in parameters to the wireless station MS1. The above described stages are known as such from the GPRS packet radio network. Furthermore, in the method according to a preferred embodiment of the present invention, message communication of the activation of the packet data connection is performed preferably in such a way that the gateway support node GGSN further transmits an identification of the wireless terminal MS1, such as the international mobile subscriber identity IMSI, and the IP address of the wireless terminal to the multimedia message server MMSV (stage 506). The e-mail addresses of the terminals determined in the multimedia message server are typically defined at the stage when the user makes a contract on the use of e-mail with the network operator. This e-mail address, as well as the identification of the wireless terminal, such as a telephone number MSISDN and/or a device identification IMSI, are stored in the multimedia message server MMSV. After receiving, in the activation message, information on the IP address allocated for the packet data connection of the wireless terminal MS1 in question, the multimedia message server MMSV is now capable of linking the e-mail address, the IP address to be used in the packet data connection, and the corresponding identification of the wireless terminal MS1 in the packet radio network HPLMN. Thus, the multimedia message server MMSV can define the wireless terminal MS1 of the right recipient on the basis of the e-mail address contained in the e-mail messages transmitted in the Internet data network. The multimedia message server MMSV is advantageously provided with a so-called mailbox for each such e-mail address which has the packet radio network HPLMN

converted to a form corresponding to a protocol known as such, and transmitted in a local area network LAN of a firm to a server SV1, which routes the message to the Internet network NW. The data transmission protocol intended for the transmission of e-mail messages is the SMTP protocol. In the Internet network NW, the multimedia message is transmitted on the basis of the IP address of the recipient via one or more routers, in the example of Fig. 3, to the multimedia message server MMSV of a mobile operator. The multimedia message server MMSV receives the multimedia message and stores it in a mailbox established in its memory means (not shown). In the next phase, the multimedia message server MMSV examines on the basis of the IP address, whether the wireless terminal MS1 of the recipient is logged in to the GPRS network, and whether it has active packet data connections. This can be implemented advantageously by examining from the database established in the multimedia message server MMSV the state information of the IP address contained in the multimedia message. Thus, it is not necessary for the multimedia message server to perform polling. If the wireless terminal MS1 of the recipient is connected to the GPRS network and has an active packet data connection, the multimedia message server transmits a message via the gateway support node GGSN to the packet radio network HPLMN, in which the message is routed via the serving support node SGSN to the base station system BSS, to which the wireless terminal MS1 is coupled at that moment. If the wireless terminal MS1 is not coupled to the packet radio network HPLMN or it does not have active packet data connections, the multimedia message server does not transmit the message or pollings, but the message is stored in the memory means of the multimedia message server. The multimedia message server MMSV waits for information on the activation of the packet data connection, transmitted from the gateway support node GGSN, before the multimedia message server MMSV transmits the multimedia message to the packet radio network via the gateway support node GGSN.

Before transmitting the message to the packet radio network, the message is framed into packets according to the packet radio network

be determined that the multimedia message server MMSV transmits to the wireless terminal MS1, for example in a short message, information on such messages, which have been received in the e-mail box of the user and for which automatic transmission is inhibited.

In a situation where the multimedia message server MMSV is aware that the wireless terminal MS1 of the user is logged in to the packet network HPLMN and that it has one or more active packet data connections, the multimedia message server examines the received messages to find out whether automatic transmission is allowed and transmits to the packet radio network, advantageously by means of the SMTP protocol, such messages for which the user has not prevented automatic transmission. These messages are transferred in the multimedia message server to an SMTP message sequence, and the multimedia message server MMSV advantageously establishes a connection according to the TCP protocol to the wireless terminal MS1 of the recipient of the messages. The wireless terminal MS1 only accepts a connection established by the multimedia message server MMSV in question. In this way it is possible to prevent interference caused by terminals of unauthorized users.

In the foregoing, the activation of a packet data connection and its use in multimedia message communication has been described. Furthermore, a situation will be described, in which a user of the wireless terminal MS1 wishes to terminate, i.e deactivate a packet data connection. This is also shown in the arrow diagram of Fig. 5c in a reduced manner. A deactivation request (Deactivate PDP Context Request) is transmitted from the wireless terminal to the serving support node SGSN (stage 513). This deactivation request transmits, for instance, information on the temporary identification TLLI allocated for the wireless terminal MS1. At the next stage, the serving support node SGSN conducts, if necessary, authentication of the wireless terminal MS1 and exchange of the encryption key (stage 514). After this, the serving support node SGSN transmits a packet data connection delete message (Delete PDP Context Request) to the gateway support node GGSN, which deletes the data of the packet

by means of which it is possible to enhance wireless communication. This WAP proxy and Mowgli proxy can be used to conduct protocol transforms. For example messages coming from the Internet network NW are first directed to the multimedia message server MMSV and after this, if desired, to the proxy, in which a protocol transform is conducted. Thus, the multimedia message server advantageously requires support only for the SMTP, IMAP, and HTTP (Hyper Text Transfer Protocol) data transmission protocols.

The invention is not restricted solely to the embodiments presented above, but it can be modified within the scope of the appended claims.

4. The method according to claim 1, 2, or 3, **characterized** in that in the data transmission system, a data transfer protocol in a packet form, intended for e-mail transmission, such as SMTP, is used, wherein multimedia messages are formed into packets according to said data transfer protocol.

5. The method according to claim 4, **characterized** in that data of the type of the multimedia message is transmitted in the multimedia messages, wherein in the method it is possible to select which types of multimedia messages are transmitted in the activated data transmission connection.

6. The method according to claim 4 or 5, **characterized** in that multimedia messages are formed into packets according to an Internet protocol, which are framed at the transmission stage into packets according to a data transfer protocol intended for transmitting e-mail messages, and which packets are formed into packets according to the Internet protocol in said terminal (MS1).

7. The method according to any of the claims 1 to 6, **characterized** in that information on deactivation of the data transmission connection activated for said wireless terminal (MS1) is transmitted to the multimedia message server (MMSV).

8. A system for transmitting multimedia messages to a wireless terminal (MS1), the system comprising at least one mobile communication network (HPLMN), at least one multimedia message server (MMSV), means (SGSN, GGSN) for specifying an identifying address for each wireless terminal (MS1) connected to the mobile communication network (HPLMN), means (BSS, SGSN, GGSN) for activating at least one data transmission connection for said wireless terminal (MS1), **characterized** in that the data transmission system also comprises means (GGSN) for transmitting to the multimedia message server (MMSV) information on activation of a data transmission connection for said wireless terminal (MS1).

13. A multimedia terminal (MS1) which is intended to be used in the system according to any of the claims 8 to 11, **characterized** in that the multimedia terminal (MS1) comprises means for transmitting a data transmission connection activation request to the mobile communication network (HPLMN).

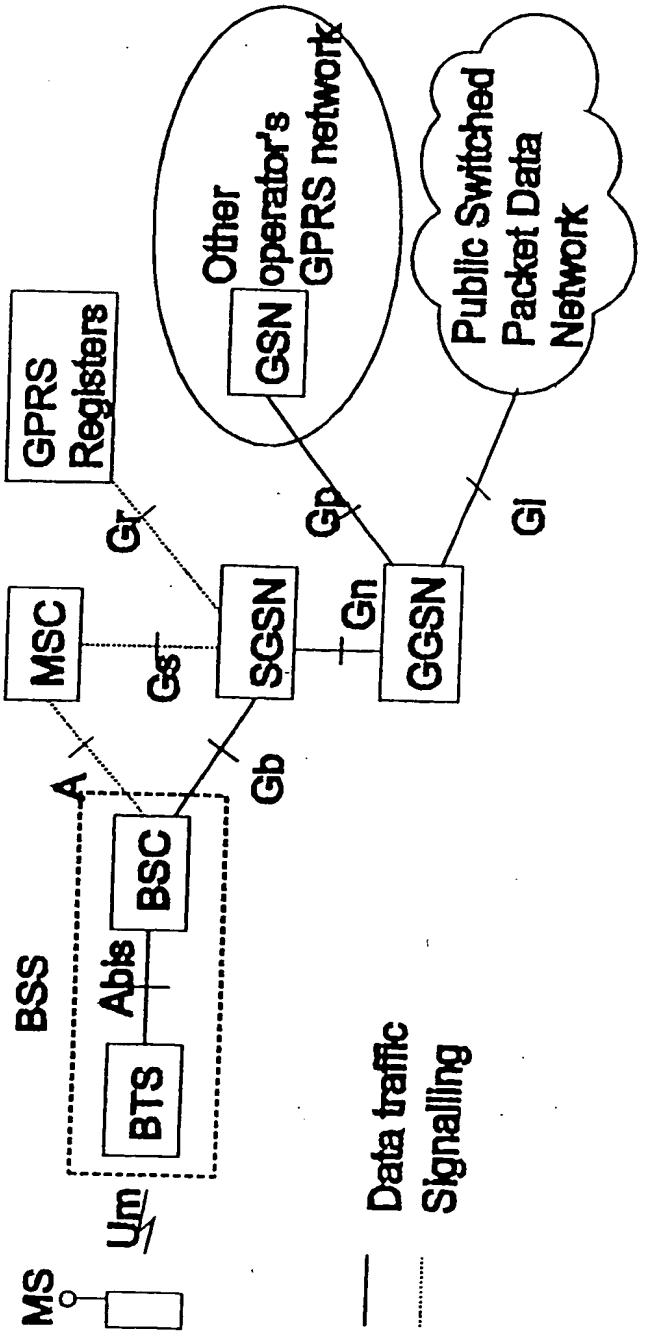
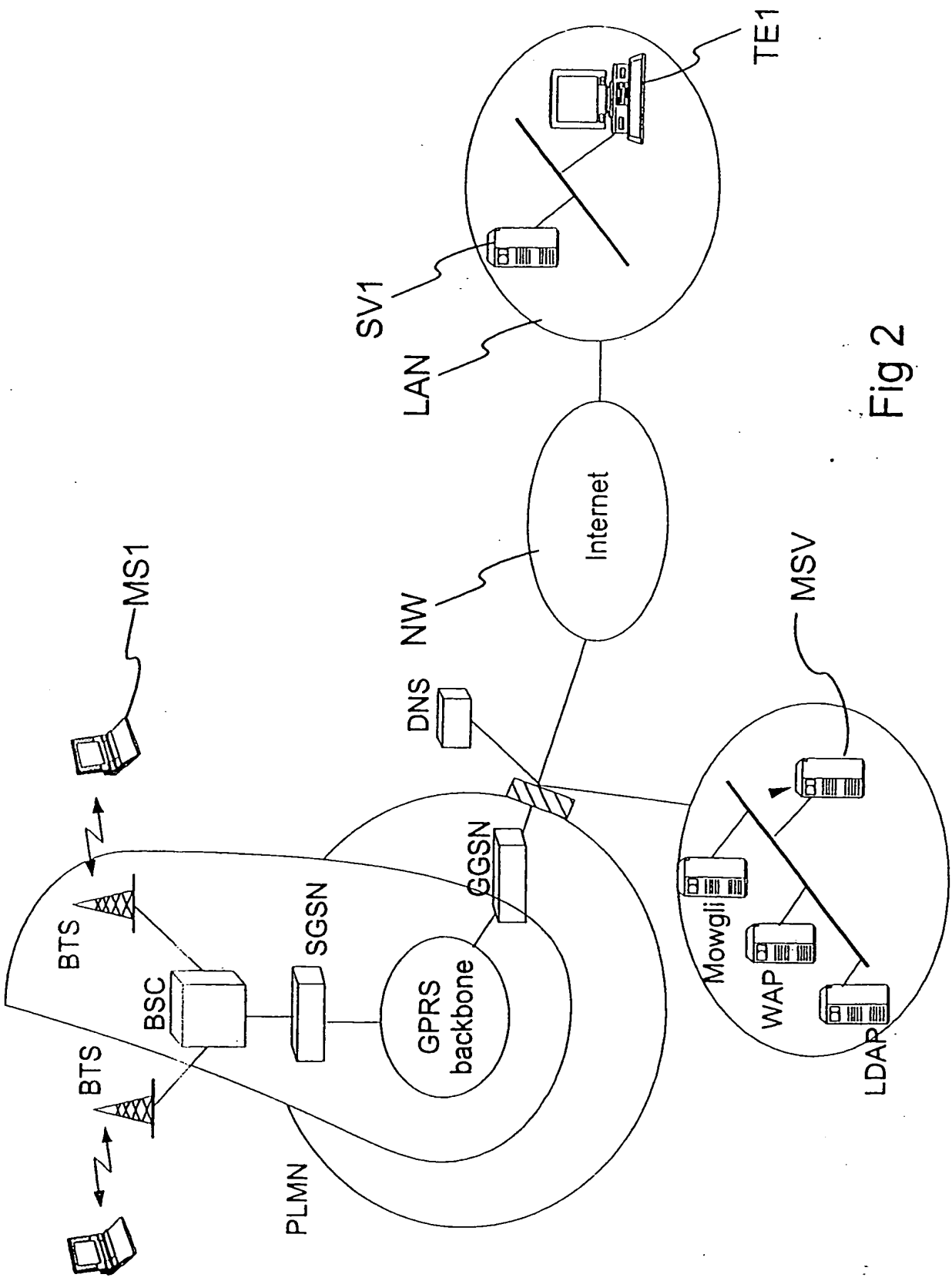

Other operator's GPRS network
GSN
Public Switched Packet Data Network
GPRS Registers
Gr
Gp
Gi
MSC
Gs
SGSN
Gn
GGSN
A
Gb
BSS
Abis
BSC
BTS
Um
MS
Data traffic
Signalling

Fig 1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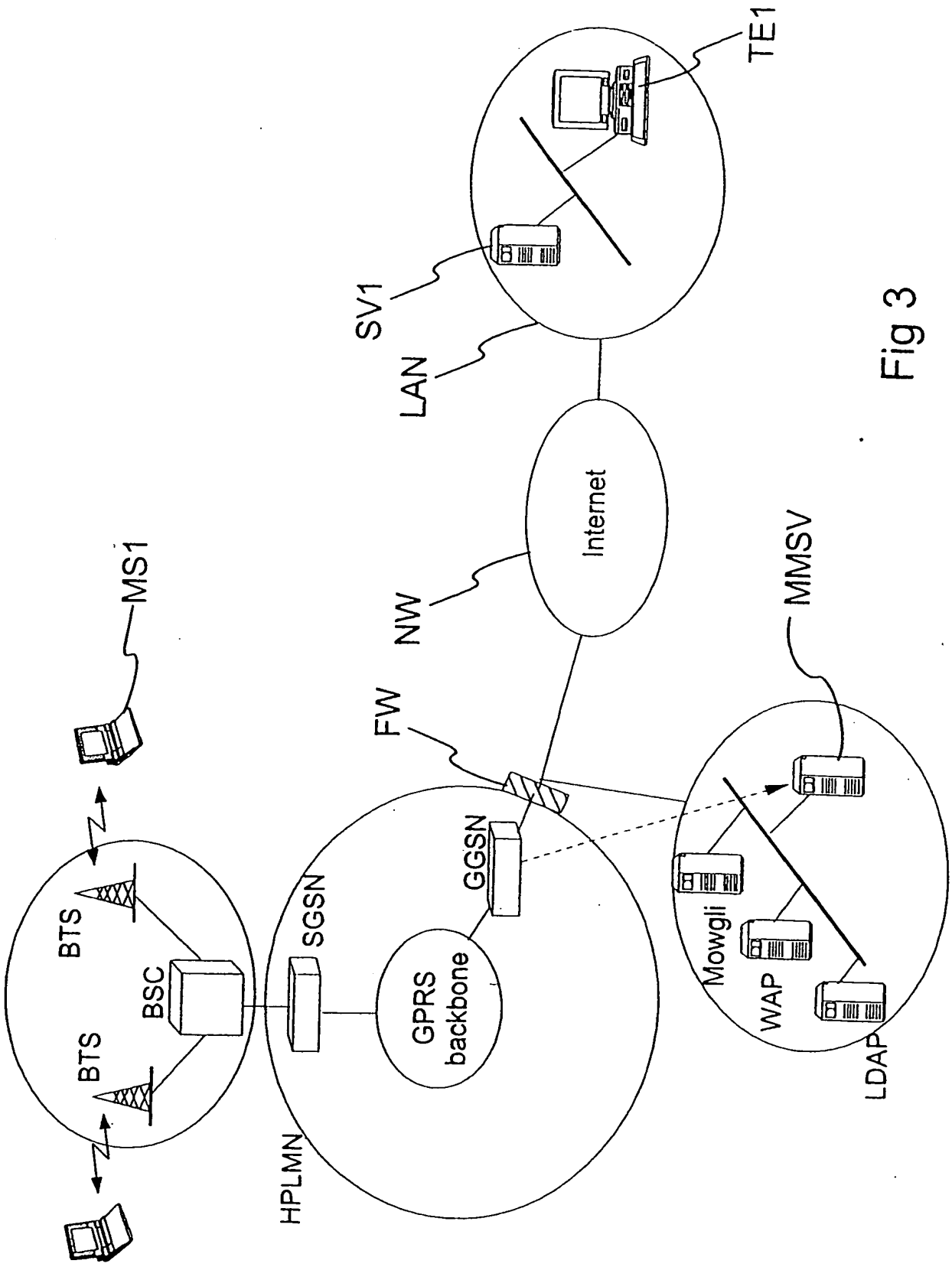
SV1
LAN
Internet
NW
DNS
MSV
MS1
BTS
BSC
SGSN
GGSN
GPRS backbone
BTS
PLMN
Mowgli
WAP
LDAP

Fig 2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SV1
LAN
Internet
NW
MMSV
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MS1
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BSC
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SGSN
GGSN
GPRS backbone
HPLMN
Mowgli
WAP
LDAP

Fig 3

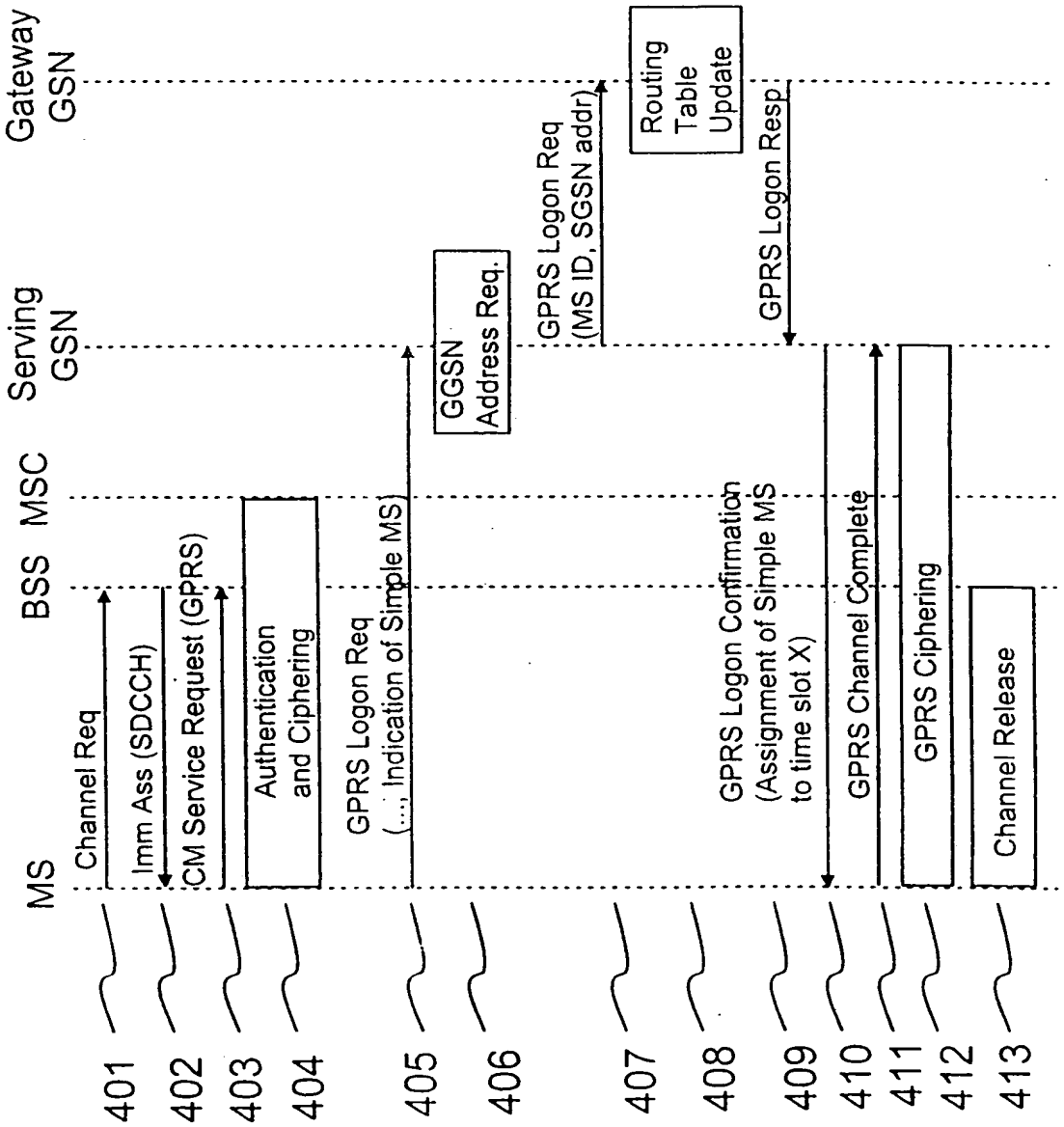
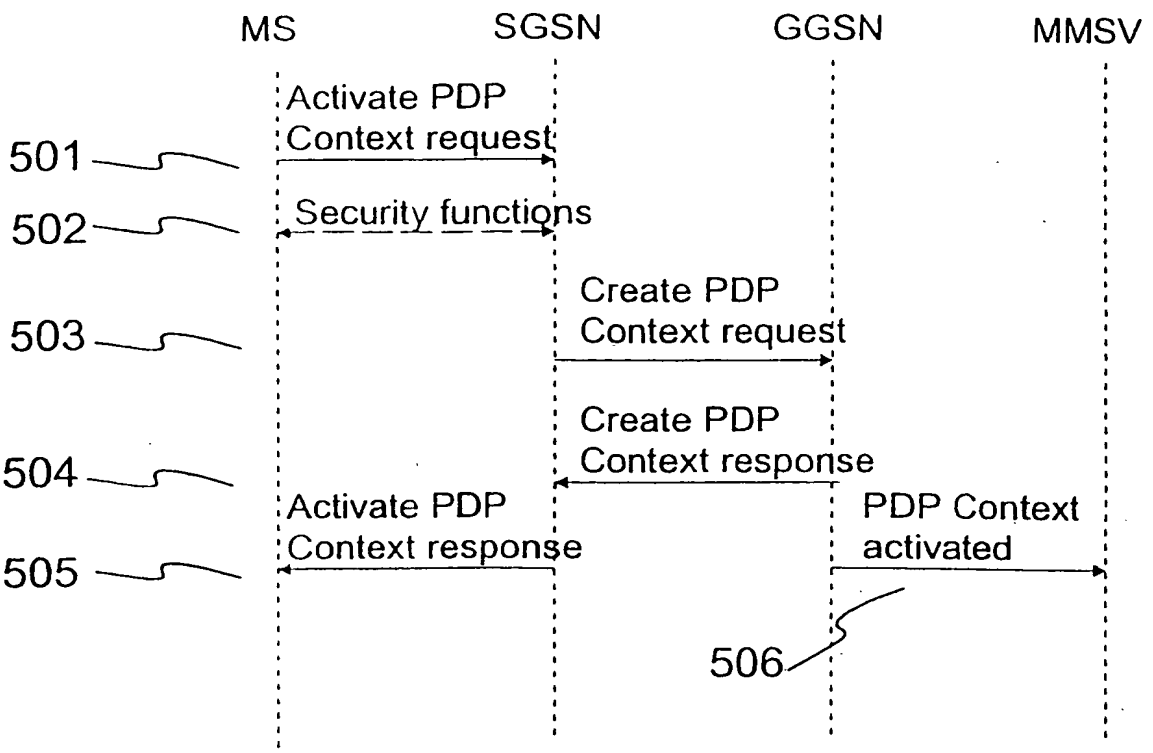

MS
BSS
MSC
Serving GSN
Gateway GSN
Channel Req
Imm Ass (SDCCH)
CM Service Request (GPRS)
Authentication and Ciphering
GPRS Logon Req (..., Indication of Simple MS)
GGSN Address Req.
GPRS Logon Req (MS ID, SGSN addr)
Routing Table Update
GPRS Logon Resp
GPRS Logon Confirmation (Assignment of Simple MS to time slot X)
GPRS Channel Complete
GPRS Ciphering
Channel Release
401
402
403
404
405
406
407
408
409
410
411
412
413

Fig 4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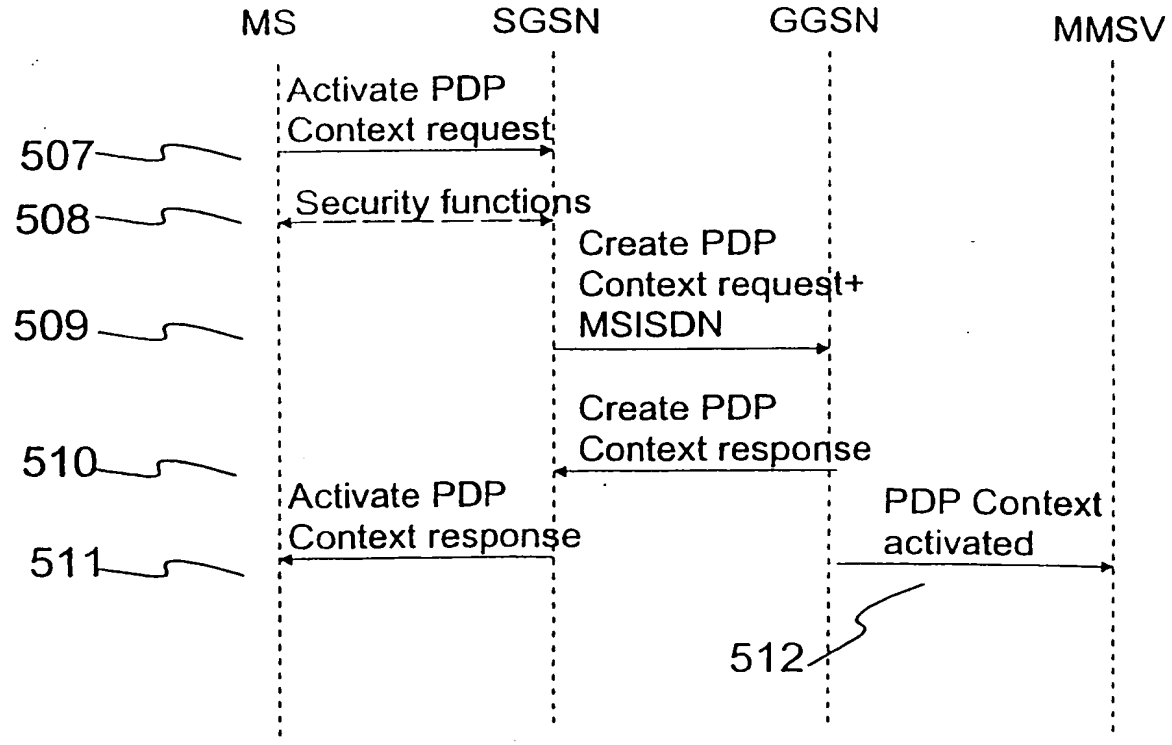
SGSN
GGSN
MMSV
Activate PDP Context request
501
Security functions
502
Create PDP Context request
503
Create PDP Context response
504
Activate PDP Context response
505
PDP Context activated
506

Fig 5a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MMSV
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Create PDP Context request+ MSISDN
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Create PDP Context response
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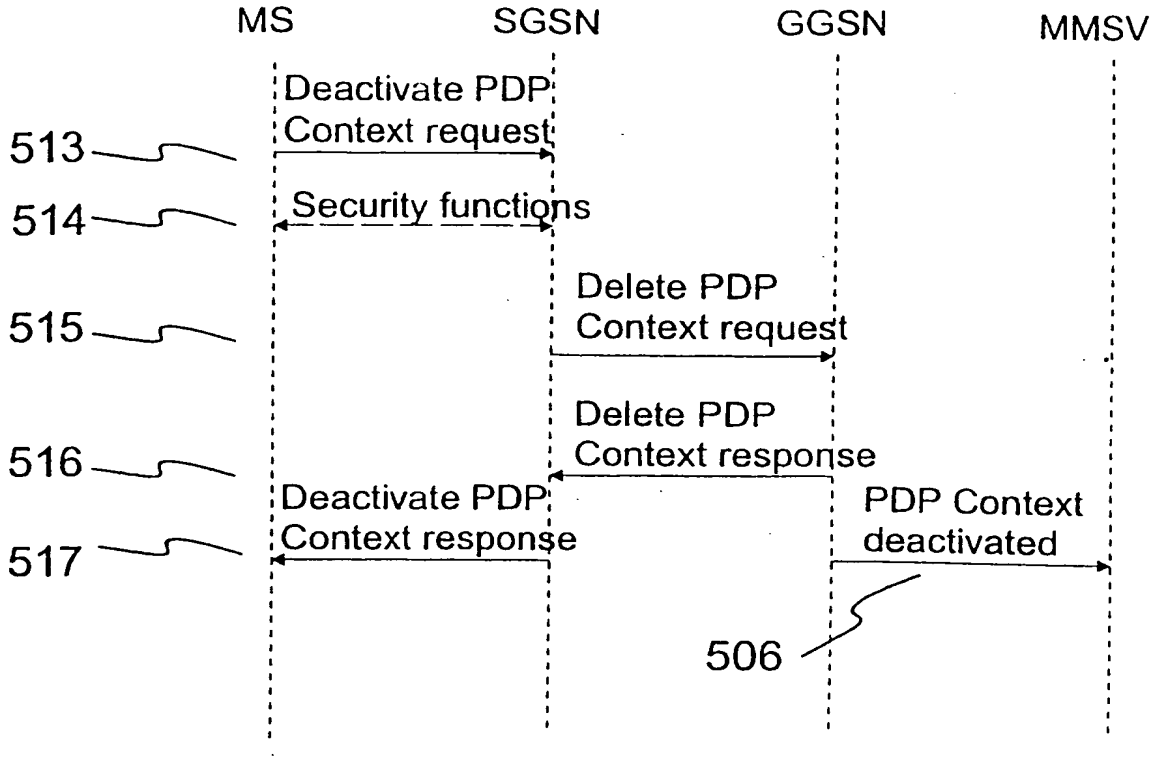
Activate PDP Context response
511
PDP Context activated
512

Fig 5b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GGSN
MMSV
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Security functions
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Delete PDP Context request
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Delete PDP Context response
516
Deactivate PDP Context response
517
PDP Context deactivated
506

Fig 5c